Claims

1. A process for preparing a polymer of an ethylenically unsaturated monomer, in which the monomer is obtainable from a biocatalysed reaction or a fermentation process, and wherein the monomer contains cellular material and/or components of a fermentation broth,
forming the polymer by polymerising the ethylenically unsaturated monomer or a monomer mixture comprising the ethylenically unsaturated monomer, wherein there is substantially no removal of the cellular material and/or components of the fermentation broth from the ethylenically unsaturated monomer.

2. A process according to claim 1 in which the ethylenically unsaturated monomer is prepared by providing a substrate that can be converted into the ethylenically unsaturated monomer,
contacting the substrate with a biocatalyst which biocatalyst comprises a microorganism or cellular material and thereby converting the substrate into the ethylenically unsaturated monomer containing the cellular material and optionally components of a fermentation and this process is carried out inside or outside of the cell and and where it is carried out inside the cell it optionally forms part of a metabolic pathway of the microorganism.

3. A process according to claim 2 in which the biocatalyst comprises a microorganism and wherein the process is carried out inside the cell and forms part of a metabolic process of the microorganism.

4. A process according to any of claims 1 to 3 in which the cellular material comprises whole cells.

5. A process according to any of claims 1 to 4 in which the cellular material comprises fractured cellular material.

6. A process according to claim 5 in which the fractured cellular material is selected from the group consisting of cell wall material, cell membrane material, cell nucleus material, cytoplasm and proteins.

7. A process according to any of claims 1 to 6 in which the components of the fermentation broth are selected from the group consisting of sugars,

polysaccharides, proteins, peptides, amino acids, nitrogen sources, inorganic salts (including metal salts), vitamins, growth regulators,enzyme inducers and complex fermentation medium components such as corn steep liquor and yeast extract.

8. A process according to any of claims 1 to 7 in which the ethylenically unsaturated monomer is (meth)acrylamide monomer.

9. A process according to any of claims 2 to 8 in which the substrate is (meth)acrylonitrile.

10. A process according to any of claims 2 to 9 in which the biocatalyst comprises a nitrile hydratase enzyme.

11. A process according to any of claims 1 to 10 in which the polymer is a homopolymer or copolymer of (meth) acrylamide.

12. A process according to any of claims 1 to 7 in which the ethylenically unsaturated monomer is selected from the group consisting of itaconic acid (or salts thereof), maleic acid (or salts thereof) and (meth) acrylic acid (or salts or derivatives thereof).

13. A process according to any of claims 2 to 7 or claim 12 in which the substrate is selected from the group consisting of lactic acid, 3-hydroxpropionic acid, and glycerol.

14. A process according to any of claims 2 to 13 in which the substrate is introduced into a vessel and contacted with a biocatalyst and wherein the substrate is converted into the ethylenically unsaturated monomer, optionally introducing other monomers into the vessel to form a monomer mixture, subjecting the ethylenically unsaturated monomer or monomer mixture to polymerisation conditions, optionally by introducing initiators into the vessel, and thereby forming the polymer inside the vessel.

15. A process according to claim 14 in which the biocatalyst is produced in the vessel.

16. A process according to any of claims 2 to 15 in which the biocatalyst comprises microorganisms of the Rhodococcus genus, preferably species Rhodococcus rhodochrous.

17. A process according to claim 16 in which the microorganism is Rhodococcus rhodochrous NCIMB 41164.

18. A composition comprising a polymer of an ethylenically unsaturated monomer and further comprising cellular material and/or components of a fermentation broth, wherein the composition is obtainable by a process according to any of claims 1 to 17.